Experimental (Bio-$CaCO_3$ production)

Waste mussel shells

Immersion in 1 M KOH solution for 14 days to remove protein

Cleaning with water

Bake at 300ºC for 3 h to remove organic component

Grinding

Color bleaching with 50% H_2O_2

Sieving the $CaCO_3$ powder

Dried Bio-$CaCO_3$ powder

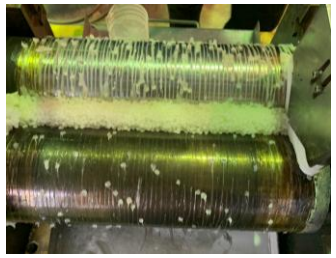
Experimental (Bio-$CaCO_3$/PLA compounding)

PLA

Bio-$CaCO_3$

Weigh polylactic acid (PLA) and Bio-$CaCO_3$ in various ratios

1. Melt PLA



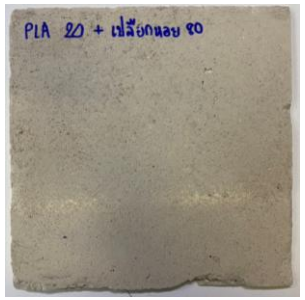
2. Add Bio-$CaCO_3$

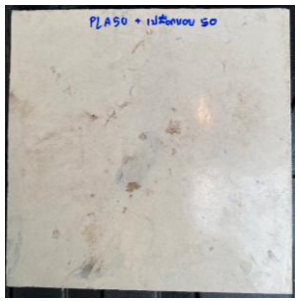
3. Mix until well combined

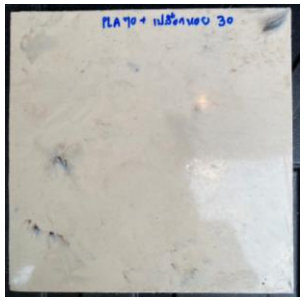
4. Remove polymer compound from machine

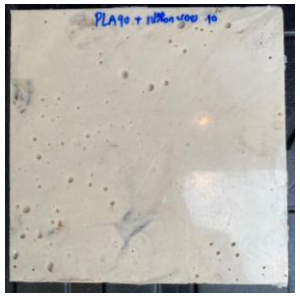
Grinding polymer compound for compression processing

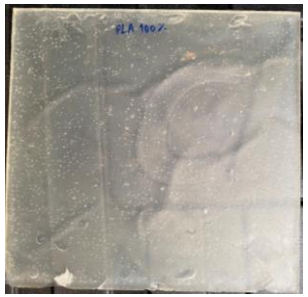
Forming Bio-CaCO3/PLA compound with hot compression molding











Bio-CaCO3/PLA composite in various ratios

PLA

10% crushed shell + PLA

50% crushed shell + PLA

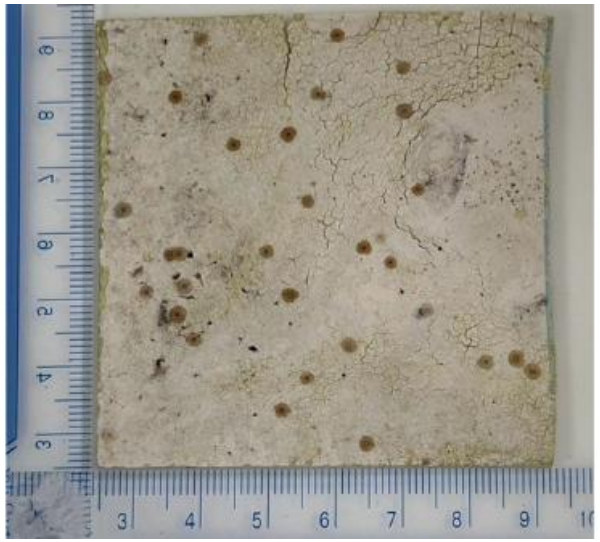
60% crushed shell + PLA

70% crushed shell + PLA

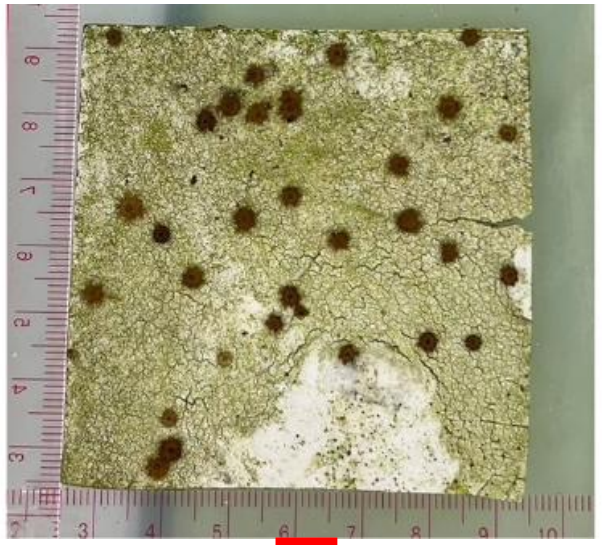
Concrete Plate DAY 1-42.
No coral polyps settlement

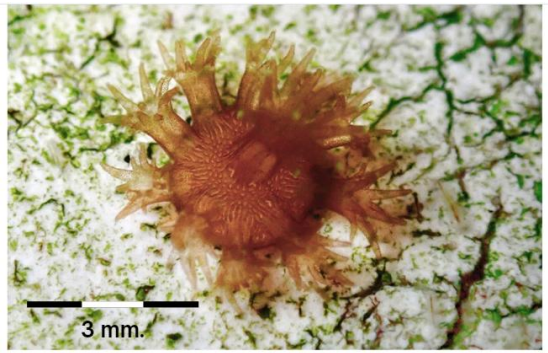
DAY 1

DAY 11



DAY 42



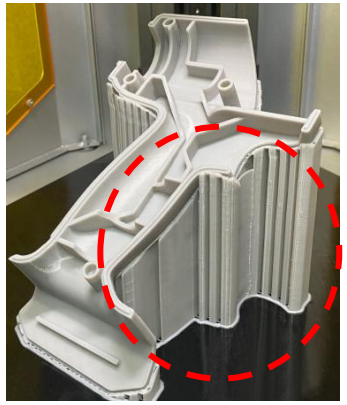


Coral colony

Waste mussel shells

Mussel shells powder

Compounding

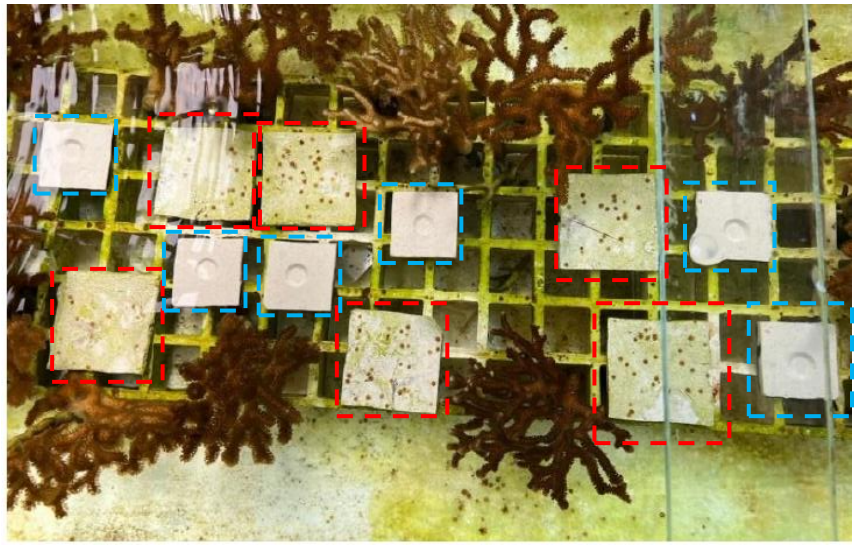


Waste Polylactic acid

Polylactic acid scrap

PolypThrive

PolypThrive vs. Concrete plate



Mr. Pruttipong Pantamanatsopa

Miss. Nanthida laumud

Assoc.Prof.Dr.Warunee Ariyawiriyanan
Faculty of Engineering
Rajamangala University of Technology Thanyaburi
E-mail: warunee.a@en.rmutt.ac.th

Dr.Sanong Ekgasit
Faculty of Science
Chulalongkorn University
E-mail: sanong.e@chula.ac.th

Dr.Chutiparn Lertvachirapaiboon
National Nanotechnology Center
E-mail chutiparn.ler@nanotec.or.th

Dr. Bunlung Nuangsaeng
The Institute of Marine Science,
Burapha University
E-mail: bunlung@buu.ac.th